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10/762,249	01/23/2004	John Minkoff	0918.0227C	4502

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EXAMINER

MULL, FRED H

ART UNIT	PAPER NUMBER
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3662

DATE MAILED: 01/06/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/762,249

Applicant(s)

MINKOFF ET AL.

Examiner

Fred H. Mull

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-34 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 January 2004 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Claim Objections

1. Claim(s) 32 is/are objected to under 37 CFR 1.75. The claim is identical to claim 12.
 12. The examiner will treat this claim as depending on claim 15 rather than claim 1.
- Correction is required.

35 USC § 112 6th Paragraph

The following is a quotation of the sixth paragraph of 35 U.S.C. 112:

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

2. Claim(s) 33 is/are interpreted by the examiner as invoking 35 USC 112 6th paragraph (means plus function). See MPEP § 2181.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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3. Claims 1-11, 13-21, and 33-34 are rejected under 35 U.S.C. 102(b) as being anticipated by Castella.

In regard to claims 1, 15-21, and 33-34, Castella discloses selecting a plurality of angular directions at which nulls are to be located in an antenna radiation pattern of the phased array antenna; computing a radiation shaping transformation as a function of the selected angular directions; and determining from the radiation shaping transformation an amplitude and phase distribution over the array of antenna elements that forms the antenna beam with nulls of the antenna radiation pattern at the selected angular directions (abstract; p. 887, final ¶, p. 888, final ¶), where the amplitude will be determined to be unity.

In regard to claims 2-3, 13-14, and 22-23, Castella further discloses constructing a plurality of vectors corresponding to the selected angular directions at which the nulls are to be located; and computing a matrix whose product with each of the vectors is zero; wherein the amplitude and phase distribution is determined from the matrix (p. 887-888, section: Method of Solution).

In regard to claims 4-9 and 24-29, Castella further discloses applying amplitude tapering to the phased array antenna to reduce sidelobe levels of the antenna radiation pattern relative to a uniform illumination radiation pattern (abstract, lines 5-9).

In regard to claims 10-11 and 30-31, Castella further discloses the antenna beam can be a transmit or receive antenna beam (abstract).

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4. Claims 1-11, 13-31, and 33-34, are rejected under 35 U.S.C. 102(b) as being anticipated by Godara.

In regard to claims 1, 4-9, 15-21, 24-29, and 33-34, Godara discloses selecting a plurality of angular directions at which nulls are to be located in an antenna radiation pattern of the phased array antenna; computing a radiation shaping transformation as a function of the selected angular directions; and determining from the radiation shaping transformation an amplitude and phase distribution over the array of antenna elements that forms the antenna beam with nulls of the antenna radiation pattern at the selected angular directions (p. 1201, section C, 2nd ¶, line 5 to end of section C).

In regard to claims 2, 13, and 22, Godara further discloses constructing a plurality of vectors corresponding to the selected angular directions at which the nulls are to be located (p. 1201, section C, 2nd ¶, lines 10-11); and computing a matrix whose product with each of the vectors is zero (p. 1201, equation 33; p. 1202, equations 35 and 38); wherein the amplitude and phase distribution is determined from the matrix (there is not constraint limiting the weights to only acting on phases or only acting on amplitudes).

In regard to claims 3, 14, and 23, Godara further discloses the phased array antenna comprises M antenna elements, k angular directions are selected at which nulls are to be located, and the matrix is an $M \times M$ matrix of rank $M-k$ (p. 1201, section C, 2nd ¶, line 5 to end of section C).

In regard to claims 10-11 and 30-31, Godara further discloses the antenna beam can be a transmit or receive antenna beam (p. 1202, 5th ¶, line 5; p. 1212, 2nd ¶).

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5. Claims 1-9, 11, 13-29, 31, and 33-34, are rejected under 35 U.S.C. 102(b) as being anticipated by Friedlander.

In regard to claims 1, 4-9, 15-21, 24-29, and 33-34, Friedlander discloses selecting a plurality of angular directions at which nulls are to be located in an antenna radiation pattern of the phased array antenna; computing a radiation shaping transformation as a function of the selected angular directions; and determining from the radiation shaping transformation an amplitude and phase distribution over the array of antenna elements that forms the antenna beam with nulls of the antenna radiation pattern at the selected angular directions (section II).

In regard to claims 2, 13, and 22, Friedlander further discloses constructing a plurality of vectors corresponding to the selected angular directions at which the nulls are to be located (section II); and computing a matrix whose product with each of the vectors is zero (section II, p. 462, bottom, line beginning with "1"); wherein the amplitude and phase distribution is determined from the matrix (there is not constraint limiting the weights to only acting on phases or only acting on amplitudes).

In regard to claims 3, 14, and 23, Friedlander further discloses the phased array antenna comprises M antenna elements, k angular directions are selected at which nulls are to be located, and the matrix is an $M \times M$ matrix of rank $M-k$ (section II).

In regard to claims 11 and 31, Friedlander further discloses the antenna beam can be a receive antenna beam (section I, lines 1-4).

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6. Claims 1, 4-11, 15, 24-31, and 33-34 and 31-34, are rejected under 35 U.S.C. 102(b) as being anticipated by Drane.

In regard to claims 1, 4-9, 15-21, 24-29, and 33-34, Drane discloses selecting a plurality of angular directions at which nulls are to be located in an antenna radiation pattern of the phased array antenna; computing a radiation shaping transformation as a function of the selected angular directions; and determining from the radiation shaping transformation an amplitude and phase distribution over the array of antenna elements that forms the antenna beam with nulls of the antenna radiation pattern at the selected angular directions (abstract; section I).

In regard to claims 10-11 and 30-31, Drane further discloses the antenna beam can be a transmit or receive antenna beam (p. 49, final ¶).

7. Claims 1, 10-11, 15, and 31-34, are rejected under 35 U.S.C. 102(b) as being anticipated by Jacobsen.

Jacobsen discloses selecting a plurality of angular directions at which nulls are to be located in an antenna radiation pattern of the phased array antenna; computing a radiation shaping transformation as a function of the selected angular directions; and determining from the radiation shaping transformation an amplitude and phase distribution over the array of antenna elements that forms the antenna beam with nulls of the antenna radiation pattern at the selected angular directions (section 1.1, ¶ under "Adaptive Array"; Fig. 1, far right subfigure; section 1.3).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 12 and 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Castella or Godara.

It is well know to use a Gram-Schmidt orthogonalization procedure to solve for the matrix in an equation of the form: $\text{matrix} * \text{vector} = \text{zero vector}$.

9. Claims 10, 12, 30, and 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Friedlander.

In regard to claims 10 and 30, it is well know to use array antenna beamforming procedures for transmission as well as reception.

In regard to claims 12 and 32, it is well know to use a Gram-Schmidt orthogonalization procedure to solve for the matrix in an equation of the form: $\text{matrix} * \text{vector} = \text{zero vector}$.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fred H. Mull whose telephone number is 703-305-1250. The examiner can normally be reached on M-F 9:00 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas H Tarcza can be reached on 703-360-4171. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Fred H. Mull
Examiner
Art Unit 3662

fhm



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